DEPARTMENT OF COMMERCE
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Cotton Airplane Fabrics. The present all-cotton airplane fabric developed by careful and thorough investigation of the whole problem at the Bureau of Standards has all of the desirable characteristics of the highest grade linens which have regularly been used for this purpose. However, further experiments are being made and the results of some of these indicate that even better fabrics can be made.

Three of the samples developed in the earlier stages of the investigation were given service tests at the Pensacola Naval Air Station, at Langley Field and at the plant of the Canadian Aeroplane Co., Toronto.

The following comments are characteristic of the reports of those stations on the result of the service tests:

> "It is considered that these samples have been through harder than usual service conditions and have proven absolutely satisfactory in each case."
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> "Took dope and shrank better than ordinary linen."
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> "The doped cotton seems to be more elastic than the doped linen. In every case the fabric and doping (after service tests in flight and weather exposure) were found to be still in good condition."

Blanket Investigation. Approximately 61 samples of blanket material have been tested to determine heat conductivity and permeability to air. It is believed that not only can cotton blankets be made which will be as warm as woolen blankets, but that such blankets will have very nearly the same wearing qualities. The passage of moisture through a cotton blanket appears to be little if any greater in amount than through a woolen blanket. Moreover, the savings which would be consequent upon the general use of cotton blankets for indoor service and of cravenetted cotton-and-wool mixtures for suitings and overcoatings, would permit the diversion of the more desirable wool fibre to those military uses in which it appears to be indispensable.

Aeronautic Instruments. The Bureau is doing work of a fundamental character in relation to the design and calibration of all manner of aviation instruments, including tachometers for indicating engine speed, air speed indicators, indicating and recording altitude meters, gasoline depth-indicators, barometers,

special watches, angle-of-attack indicators, statoscopes, thermometers, compasses, etc. An exhibit of typical and representative instruments of French, English and American makers, as well as a number of German instruments recovered by the French and forwarded here for examination, is being maintained for reference and example in connection with this work. Information regarding the construction and use of the various instruments is compiled from all sources, and placed at the disposal of manufacturers and interested offices of the War and Navy Departments. Sample instruments proposed for production are carefully investigated to determine the characteristics of the type, so that when production is begun it may proceed expeditiously and with assurance of a satisfactory product; moreover, after production is under way, the Bureau tests samples of the regular output to insure continued conformity with the specifications.

In the case of statoscopes, which are used for indicating with extreme sensitivity whether a balloon is ascending or descending, a serious defect in existing design was discovered.

A new type of master tachometer has been designed in order to provide facilities for rapid and accurate factory and laboratory calibration of instruments for indicating rotational speed of engines. The Bureau's knowledge of the technical points underlying the design of air speed indicators has enabled it to be of great assistance to American manufacturers in improving quality and preparing for quantity production.

On account of the increasing height at which flights are being carried on under present conditions, the Bureau was requested to calculate the data required for the graduation of altimeter dials up to 30,000 feet. On the basis of these calculations, the specifications for and manufacture of instruments can be proceeded with.

The Bureau is cooperating with the Army and Navy and the International Aircraft Standards Board in the preparation of suitable specifications for airplane instruments.

Portable Acetylene Lights. Comparative tests of portable acetylene lights have been carried out for the General Engineer Depot. Large numbers of these lights are in use and more are needed for the forces abroad. The tests made have shown the way to decided improvements in some types now in use abroad, and have made available to the War Department important data on which to base the choice of lights for future purchases.

Velocity of Projectiles. Experimental work in cooperation with one of the proving grounds, on improving the methods for the measurement of the velocity of projectiles, has recently been undertaken. Two methods have been concentrated upon, and have been tested under field conditions. While very unfavorable weather conditions have impeded the work, considerable progress has been made.

Bakelite-Impregnated Wood for Propellers. Maple wood treated in this manner was 100% heavier and only 50% more efficient in strength compared with the untreated wood. The hard resistant covering afforded by the bakelite treatment makes the use of the treated wood desirable if weight considerations can be satisfactorily disposed of. Further studies will be made in connection with spruce.

Sheet Steel Structural Members for Airplanes. Since the testing of the original designs of metal construction for airplane wings in the laboratories of the Bureau for the National Advisory Committee on Aeronautics, development work in the design and testing of improved types of spars and ribs has been in progress. The Bureau is cooperating in the work with the above committee and results have been obtained which appear very favorable for this type of construction.

Density of Hydrogen: Special Apparatus. A modified effusion apparatus for determining the density of hydrogen has been designed at the Navy Department's request for advices regarding instruments available for the purpose. This apparatus is in practical use at the Washington Navy Yard and steps are being taken to arrange for the manufacture of 50 sets of it for field use.

Light Alloys. Four reports have been prepared as a result of investigations on several phases of this work: 1. Preparation and tests of magnesium-aluminum alloys; 2. Preparation of tests of rolled alloys of aluminum-magnesium-nickel, aluminum-magnesium-copper, aluminum-magnesium-manganese; 3. Heat treatment and thermal analysis of alloys of aluminum-magnesium with copper, manganese and nickel; 4. A summary, including a bibliography of publications concerning light aluminum alloys. Important new data have recently been obtained, especially on heat treatment and thermal analysis of this group of alloys. The importance of sharply limiting the quenching temperature was established.

Fire Retarding Paints. The investigation of fire-retarding paints being practically completed has been reported to the Bureau of Yards and Docks, Navy Department. Indications are that the best of the preparations tried affords only a very limited protection. As a result of this work, it may be said that wood construction, no matter how the wood is treated after erection, will involve serious fire risk. Whitewash and sodium silicate, two of the cheapest materials tested, were found to be as efficacious as any; these two materials can well be used in combination.

Investigation of Dry Cells. The Bureau has recently undertaken a study of dry cells and other batteries with a view to obtaining first-hand information as to their characteristics under normal conditions and also under the abnormal conditions imposed by some military requirements. It has been found that the cell characteristics as stated in advertising leaflets are often misleading, due to a lack of proper understanding of the cell behavior. Perhaps the least understood characteristic of the cells is the internal

as regards permanence of the glass surface under such conditions, is being made between American glasses and the best foreign glasses available.

Magnetos. A study has been made of characteristics of aeronautic magnetos as regards their ability to continue sparking with plugs which have become partially conducting through excessive heating or fouling.

Tautness Measurement. For the purpose of measuring the tautness of airplane stay-wires, a special device has been developed at the Bureau, on which experimental work is now being done. A preliminary test of the instrument showed that the tension of such wires could be measured to an accuracy of five or ten pounds in a thousand. Results will shortly be available for general use of aeronautic constructors.

Respectfully,

S. W. STRATTON

Director.